

## A PRELIMINARY STUDY ON IMPORTANCES OF FLY-ASH BRICKS AND CLAY BRICKS IN CONSTRUCTION INDUSTRY THROUGH SPSS SOFTWARE

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### ABSTRACT

With the change of habits, choice as well as the change of the society the demand of Fly- Ash Bricks are gradually increasing day by day in the metropolitan cities. Fly-ash bricks are slow but surely replacing conventional clay bricks for constructions. It is green and environmentally friendly material. The fly ash bricks are comparatively lighter in weight and stronger and less costly than common clay bricks. Fly- ash Bricks is low value and high volume product and transporting it over long distances is uneconomical. But due to less awareness of fly ash bricks the different agencies of the construction wing using clay bricks. This research paper presents a comparison of fly-ash bricks and clay bricks. Based on Fly-ash bricks and clay bricks data collected, then analysis can be done by using statistical methods (SPSS SOFTWARE). Such a research study may prove to be beneficial to all the agencies involved in construction and also act as a foundation for future research studies.

**KEYWORDS:** Fly-Ash Bricks, Clay Bricks, SPSS Software, Cost, Construction

### INTRODUCTION

Brick is the oldest manufactured building material, and much of its history is lost in antiquity. The oldest Burnt or fired bricks have been found on the sites of the ancient cities of Babylonia, some of which are Estimated to be about 6000 years old. Clay bricks are used in a wide range of buildings for housing to factories, and in the construction of tunnels, waterways, bridges etc. Their properties vary according to the purpose for which they are intended, but clays have provided the basic material of construction for centuries. Now-a-days Fly-ash brick replaces clay brick very rapidly.



**Figure 1: Clay Bricks and Fly Ash Bricks**

Fly Ash bricks are made of fly ash, lime, gypsum and sand. These can be extensively used in all building constructional activities similar to that of common burnt clay bricks. The fly ash bricks are comparatively lighter in weight and stronger than common clay bricks. Since fly ash is being accumulated as waste material in large quantity near thermal power plants and creating serious environmental pollution problems, its utilization as main raw material in the manufacture

of bricks will not only create ample opportunities for its proper and useful disposal but also help in environmental pollution control to a greater extent in the surrounding areas of power plants. In view of superior quality and eco-friendly nature, and government support the demand for Fly Ash Bricks has picked up. Comparison of Fly ash bricks and ordinary red clay bricks are shown in Table 1

**Table 1: Comparison between Fly Ash Bricks and Clay Bricks**

<b>Fly-Ash Bricks</b>	<b>Clay Bricks</b>
Uniform pleasing color like cement	Varying color as per soil
Uniform in shape and smooth finish	Uneven shape as hand made
Dense composition	Lightly bonded
No plastering required	Plastering required
Lighter in weight	Heavier in weight
The compressive strength is around 80-100 Kg/cm <sup>2</sup>	The compressive strength is around 35 Kg/cm <sup>2</sup>
Less porous	More porous
Thermal conductivity 0.90-1.05 W/m <sup>2</sup> °C	Thermal conductivity 1.25 – 1.35 W/m <sup>2</sup> °C
Water absorption 6-12%	Water absorption 20-25%
Less costly	More costly
Environmentally friendly	Not Environmentally friendly
Saving of fertile land, pure water	Wastage of fertile land, pure water

So, Fly-ash bricks are much better than clay bricks and it's proven by showing above Table 1.

## LITERATURE REVIEW

Previous studies revealed that Fly-ash bricks are much better in all aspects than clay bricks and it's proven by showing in Table 1. It was necessary to adopt, as far as possible, more uses of fly-ash brick is beneficial for the construction industry. Jayesh Pitroda, Dr. L. B. Zala, Dr. F. S. Umrigar (2010) The fly ash characteristics, as construction material, its classification including production sources the present production of fly ash at global level and its utilization is in the range of 15 to 112 million tons of production and utilization is 38 to 85%. India produces 138 million tons of fly ash with 38% utilization. Utilization of fly ash reduces environmental problem and reduces cost of construction.

Rajiv Bhatt, Dr. F S Umrigar, Indrajit Patel, Jayesh Pitroda (2010) FAL-G bricks are slowly but surely replacing conventional clay bricks for wall constructions. It is green and environmentally friendly material. For achievement of real sustainable development, FAL-G bricks are the real need. As per one statistic, 10% switchover to fly ash bricks will use 30 million tons of fly ash every year, save the environment and coal and yield a benefit of 300 crores by way of reduction in brick cost production

Jayesh Pitroda, Mayurkumar Patoliya (2012) Fly ash is generated in large quantities especially by thermal power plants. The worldwide agricultural footprint is fast growing, with vast agricultural land cultivation and active expansion of the agro-based industry. The resulting large quantities of agricultural wastes, unfortunately, are not always well managed or utilized. These wastes can be recycled, such as by retrieving fibers from disposing leaves and fruit bunches, and then incorporated in brick-making. The aim of the present study is to investigate the strength and water absorption of fiber fly ash bricks made of fiber, and fly ash.

Ashish Kumar Parashar, Rinku Parashar (2012) Compare the compressive strength of the bricks, so for this purpose different percentage of materials were separately added within the range by weight and then the compressive strength of the Bricks was established, and then with the help of graph a comparison between compressive strength of bricks, made out of Rice Husk, Wood Ash, clay, Fly Ash and Cement was determined.

## **ABOUT SPSS SOFTWARE**

SPSS (Statistical package for the social sciences) and is a comprehensive system for analyzing data. The SPSS package consists of a set of software tools for data entry, data management, statistical analysis and presentation. SPSS integrates complex data and file management, statistical analysis and reporting function. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distributions and trends, descriptive statistics, and complex statistical analyses.

## **STRENGTHS AND LIMITATIONS**

### **Strengths**

- Very robust statistical software
- Many complex statistical tests available
- Good “ stats coach” help with interpreting results
- Easily and quickly displays data tables
- Can be easily expanded
  - Using the syntax feature
  - Purchasing add-ins

### **Limitations**

- Not intuitive to use
  - Typically requires additional training to maximize the features (at a cost )
- Graphically features not as simple as Excel

## **AREA OF APPLICATION**

- Human research management
- Project management
- Research area
- Transport area
- Banking sector
- Pharmaceutical sector
- Surveying
- Data analysis used most of every industrious.

## **RESEARCH METHODOLOGY**

The data collected to determine the Different factors on comparison of fly-ah brick and clay brick through a survey by explorative questionnaire to the respondents who are involved in the management of projects in various regions in the central Gujarat region of India. The questionnaire was designed so respondents can give the rank to their answers

based on the Likert scale. The analysis of this data can be done by two methods namely relative importance index (RII) method and secondly through statistical package for the social science (SPSS) software.

### STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES (SPSS) SOFTWARE

SPSS (Statistical package for the social sciences) Statistics 17.0 is a comprehensive system for analyzing data. It can take data from almost any type of file and use them to generate tabulated reports, charts and plots of distributions and trends, descriptive statistics, and complex statistical analyses.

Various tests which can be used for the study shown in **APPENDIX- A**.

### RELATIVE IMPORTANCE INDEX (RII) METHOD

The data have to be measured using an ordinal scale to determine the level of influence of each research variable (1 = strongly agree, 2 = Agree, 3 = Not say, 4 = Disagree, 5 = Strongly disagree).

Respondents should rate how much influence the factors used as indicators of research in comparison of fly-ash brick and clay brick from the aspects of cost, quality, time and strength.

$$\text{IMPORTANCE INDEX} = 100 * \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{5(n_5 + n_4 + n_3 + n_2 + n_1)}$$

**Figure 2**

Where

n1= number of respondents who gave the ratings of influence "Strongly agree";

n2= number of respondents who gave the ratings of influence "Agree";

n3= number of respondents who gave the ratings of influence "Not say";

n4= number of respondents who gave the ratings of influence "Disagree";

n5= number of respondents who gave the ratings of influence "Strongly disagree".

The value of the Relative Importance Index (RII) of each factor can be determined directly from the equation, while the value of the index group of factors is determined based on the mean value of the indicator.

The maximum value of the index is 5 if all respondents answered "Strongly disagree" and the minimum value of the index is 1 if all respondents answered "Strongly agree".

Because the average results obtained in the form of decimal numbers, it is necessary to determine the rating scale. For it 5 rating scale is determined to classify the level of influence from the respondents' answers.

The following is the scale which will classify the level of influence based on the index:

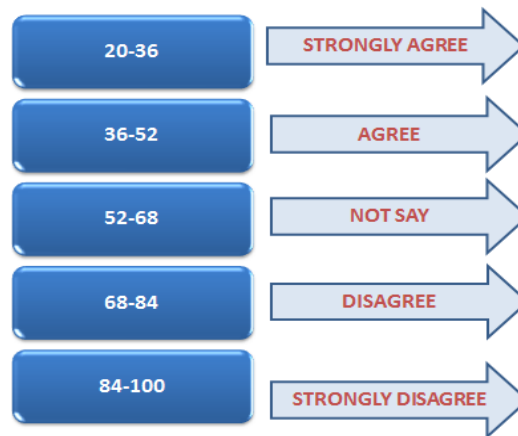


Figure 3

## CONCLUSIONS

After a detailed survey of various construction projects in central Gujarat region of India, data from respondents will be collected and analyzed by any of the above explained methods. These above methods will be helpful in generating a ranking table of these factors according to their influence which will give an idea on which factors contribute the most to the importance of utilization of fly ash bricks over to clay bricks. Proper recommendations can be given on how to increase utilization of fly ash bricks.

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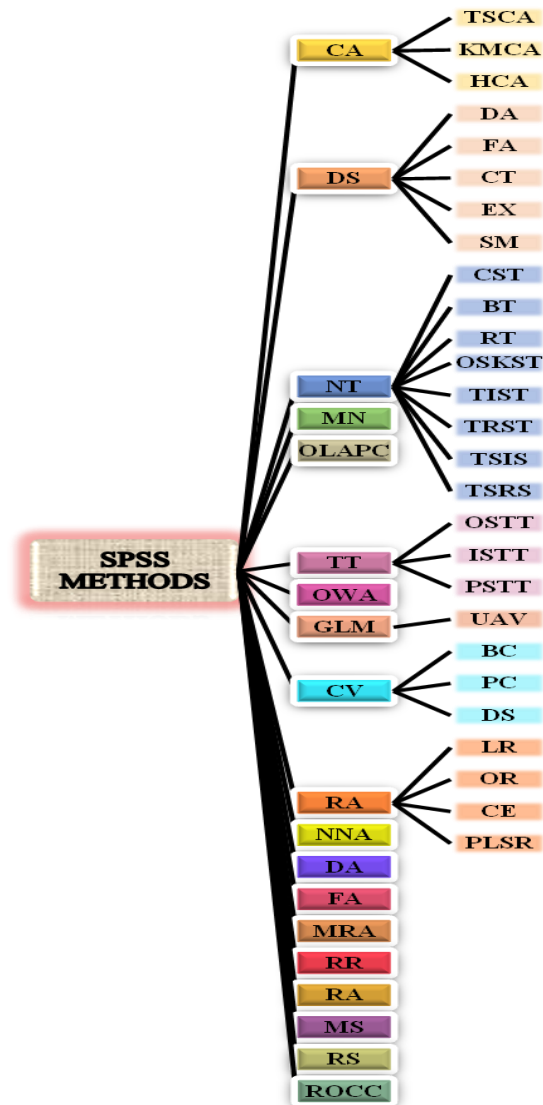


Figure 3

## APPENDIX- A

### SPSS METHODS”

#### CA – Cluster Analysis

- TSCA – Two Step Cluster Analysis
- KMCA – K-Means Cluster Analysis
- HCA – Hierarchical Cluster Analysis

#### DS – Descriptive Statistics

- DA – Descriptive Analysis
- FA – Frequencies Analysis
- CT – Crosstabs
- EX – Explore
- SM - Summarize

**NT – Nonparametric Tests**

- **CST** – Chi-Square Test
- **BT** – Binomial Test
- **RT** – Run Test
- **OSKST** – One-Sample Kolmogorov-Smirnov Test
- **TIST** – Two-Independent-Samples Tests
- **TRST** – Two Related-Samples Tests
- **TSIS** – Tests for Several Independent Samples
- **TSRS** – Tests for Several Related Samples

**MN - Means****OLAPC – OLAP Cubes****TT – T TESTS**

- **OSTT** – One Sample T Test
- **ISTT** – Independent Sample T Test
- **PSTT** – Paired Samples T Test

**OWA – One Way ANOVA****GLM – General Model (ANOVA Models)**

- **UAV** – Univariate Analysis of Variance

**CV – Correlating Variables**

- **BC** – Bivariate Correlations
- **PC** – Partial Correlations
- **DS** – Distances

**RA – Regression Analysis**

- **LR** – Linear Regression
- **OR** – Ordinal Regression
- **CE** – Curve Estimation
- **PLSR** – Partial List Squares Regression

**NNA – Nearest Neighbor Analysis****DA – Discriminant Analysis****FA – Factor Analysis****MRA – Multi Response Analysis****RR – Reporting Results****RA – Reliability Analysis****MS – Multidimensional Scaling****RS – Ration Statistics****ROCC – ROC Curves**